

ABSTRACT

A method for forming a contact using a Cu line in semiconductor fabrication process is disclosed. An example method forms a dual damascene pattern by etching a pre-metal dielectric (PMD) layer formed on a substrate. The dual damascene pattern includes a contact hole portion located on the substrate and a trench portion located on the contact hole portion. The width of the contact hole portion is narrower than that of the trench portion. The example method deposits a tungsten diffusion barrier on sidewalls of the damascene pattern, fills the damascene pattern with tungsten by depositing tungsten on the tungsten diffusion barrier to form a tungsten layer and uses chemical mechanical polishing to polish a portion of the tungsten layer over the trench portion. The example method also etches an upper part of the tungsten layer in the trench portion to form a tungsten plug that occupies a lower part of the tungsten layer in the trench portion and the contact hole portion, deposits a Cu diffusion barrier on the tungsten plug, and deposits a Cu on the Cu diffusion barrier.